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L14 and height and elevat\$	1

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DB=USPT; THES=ASSIGNEE; PLUR=YES; OP=OR

<u>L18</u>	L14 and height and elevat\$	1	<u>L18</u>
<u>L17</u>	L15 and (camera or sensor\$)	1	<u>L17</u>
<u>L16</u>	L15 and camera	0	<u>L16</u>
<u>L15</u>	L14 and vehicle	1	<u>L15</u>
<u>L14</u>	5874904.pn.	1	<u>L14</u>

DB=PGPB; THES=ASSIGNEE; PLUR=YES; OP=OR

<u>L13</u>	L5 and (size or dimension)	0	<u>L13</u>
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<u>L5</u>	20020026274	1	<u>L5</u>

*DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD;
THES=ASSIGNEE; PLUR=YES; OP=OR*

<u>L4</u>	L3 and (collid\$ or collision\$)	7	<u>L4</u>
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<u>L2</u>	sensor\$.clm. and (vehicle or automobile or car\$).clm. and control\$.clm. and @ad<=20031222	20517	<u>L2</u>
<u>L1</u>	sensor\$.clm. and (vehicle or automobile or car\$).clm. and control\$ and @ad<=20031222	26004	<u>L1</u>

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☐ **1. Document ID: US 20030220728 A1**

L4: Entry 1 of 7

File: PGPB

Nov 27, 2003

PGPUB-DOCUMENT-NUMBER: 20030220728

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20030220728 A1

TITLE: Vehicle pre-crash sensing based conic target threat assessment system

PUBLICATION-DATE: November 27, 2003

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Rao, Manoharprasad K.	Novi	MI	US
Prakah-Asante, Kwaku O.	Commerce Twp.	MI	US
Strumolo, Gary Steven	Beverly Hills	MI	US

US-CL-CURRENT: [701/45](#); [340/436](#), [340/903](#), [701/301](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWC	Draw D
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☐ **2. Document ID: US 20020163444 A1**

L4: Entry 2 of 7

File: PGPB

Nov 7, 2002

PGPUB-DOCUMENT-NUMBER: 20020163444

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20020163444 A1

TITLE: User assistance system for an interactive facility

PUBLICATION-DATE: November 7, 2002

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY
Budnovitch, William F.	Kansas City	MO	US

US-CL-CURRENT: [340/932.2](#); [340/691.6](#), [340/988](#)

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 3. Document ID: US 6801843 B2

L4: Entry 3 of 7

File: USPT

Oct 5, 2004

US-PAT-NO: 6801843

DOCUMENT-IDENTIFIER: US 6801843 B2

TITLE: Vehicle pre-crash sensing based conic target threat assessment system

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 4. Document ID: US 6642855 B2

L4: Entry 4 of 7

File: USPT

Nov 4, 2003

US-PAT-NO: 6642855

DOCUMENT-IDENTIFIER: US 6642855 B2

TITLE: User assistance system for an interactive facility

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 5. Document ID: US 5204814 A

L4: Entry 5 of 7

File: USPT

Apr 20, 1993

US-PAT-NO: 5204814

DOCUMENT-IDENTIFIER: US 5204814 A

TITLE: Autonomous lawn mower

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 6. Document ID: US 4997283 A

L4: Entry 6 of 7

File: USPT

Mar 5, 1991

US-PAT-NO: 4997283

DOCUMENT-IDENTIFIER: US 4997283 A

TITLE: Vehicle straightener measuring unit, measuring apparatus reliant on reflected beams, and source, targets and method

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw D
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☐ 7. Document ID: US 4320287 A

L4: Entry 7 of 7

File: USPT

Mar 16, 1982

US-PAT-NO: 4320287

DOCUMENT-IDENTIFIER: US 4320287 A

TITLE: Target vehicle tracking apparatus

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Documents	Claims	KMIC	Draw D
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Terms	Documents
L3 and (collid\$ or collision\$)	7

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L8: Entry 1 of 1

File: PGPB

Feb 28, 2002

DOCUMENT-IDENTIFIER: US 20020026274 A1

TITLE: Cruise control system and vehicle loaded with the same

Pre-Grant Publication (PGPub) Document Number:
20020026274

Detail Description Paragraph:

[0069] Let us assume here that a reference parameter value for geometric feature value of the image patterns 20a of the leading vehicle 20A is defined based on the speed V of the master vehicle 20B. For this purpose, an existing vehicle speed sensor 110 must be connected to the ACC unit 13 in place of the travel start detector 12 as shown in FIG. 11, in order to detect the traveling speed V of the vehicle 20B successively. While the hardware is otherwise the same as that of the system shown in FIG. 1, a microcomputer 15' of the system shown in FIG. 11 performs processes different from those of the microcomputer 15 in FIG. 1. Therefore, a reference parameter value setting process section 15'A implemented by the microcomputer 15' of the system in FIG. 11 includes (8) a braking distance calculation process portion 15'A.sub.1 for calculating a braking distance L required by the vehicle 20B to stop based on data V outputted from the vehicle speed sensor 110 and (9) a coordinate transformation process portion 15'A.sub.2 for calculating a reference parameter value for geometric feature value of image patterns 20a of the leading vehicle 20A based on the braking distance L calculated by the braking distance calculation process portion 15'A.sub.1.

Detail Description Paragraph:

[0091] If the vehicle data V from the vehicle speed sensor 110 does not indicate 0 km/h, similarly to the processes performed at steps 131 and 132 of the flow chart in FIG. 13, the braking distance calculation process portion 15'A.sub.1 calculates a braking distance L for the vehicle 20B based on the latest vehicle speed data V, and the coordinate transformation process portion 15'A.sub.2 thereafter calculates a reference parameter value for geometric feature value of the image patterns 20a of the leading vehicle based on the braking distance L. The reference parameter value selection process portion 15'A.sub.3 updates the reference parameter value W.sub.0 with the value thus calculated (step 179). Thereafter, processes at step 180 and subsequent steps are performed in the same way as in the case wherein a quantity of change of the vehicle speed data V within a predetermined time does not exceed a threshold.

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L18: Entry 1 of 1

File: USPT

Feb 23, 1999

DOCUMENT-IDENTIFIER: US 5874904 A

**** See image for Certificate of Correction ****

TITLE: Inter-vehicle distance measurement apparatus

Brief Summary Text (46):

An inter-vehicle distance measurement apparatus according to a fourth aspect is based on an inter-vehicle distance measurement apparatus according to any of the first to third aspects, wherein the vehicle detection means determines whether a nearest measured distance corresponds to a vehicle candidate or a road surface, for all the sensor lines in which an image of the white line is absent, by using a measured distance (L(W.sub.i min) or nearest measured distance at which a measurement window is located at the lowest position among the measured distances (L(W.sub.i)) that are detected on the sensor line (line number(i) (l.ltoreq.i.ltoreq.m)); and a measurement distance (L (W.sub.i up)) for the measurement window at the address (W.sub.i up) higher than the address (W.sub.i min) or starting-point window address of the measurement window by a number of addresses (.DELTA.Wup) at least corresponding to the height (minimum height of the vehicle H) of a vehicle possibly present at this nearest measured distance. If it corresponds to a vehicle candidate, the vehicle detection means determines the nearest measured distance as the vehicle candidate distance (LVehicle(i)) and the relevant sensor line as the vehicle detection candidate sensor line.

Detailed Description Text (38):

This data is then identified by determining if there is substantially the same distance as the measured distance L(W.sub.i min) (in this case, distance within L (W.sub.i min).+...DELTA.L(Vehicle), but Equation (14) shows a vehicle error length .DELTA.L(Vehicle), described below) in the measurement window at a window address W.sub.i up or higher that is higher (elevation) than the minimum window address W.sub.i min by a certain number of addresses on the sensor line No. i (FIG. 6, S23 and S24.)

Detailed Description Text (39):

The reason for the above determination is that since an obstacle, such as a vehicle, has a certain height perpendicular to the road surface, as shown in FIGS. 9 and 10, substantially the same distance L(W.sub.i up) as the measured distance L (W.sub.i min) appears at the window address W.sub.i up higher than the minimum window address W.sub.i min by a distance equal to the minimum height of the vehicle. On the contrary, if the vehicle is not present at the measured distance L (W.sub.i min), the measured distance is L'(W.sub.i up) in FIG. 10 at the window address W.sub.i up higher than the minimum window address W.sub.i min by a distance equal to the minimum height of the vehicle. Thus, L(W.sub.i min)=L'(W.sub.i up) is not satisfied.

Detailed Description Text (47):

.theta.attach: sensor attachment elevation angle(see FIG. 14),

Detailed Description Text (49):

H.sub.o : attachment height of the distance measurement apparatus from the road surface (see FIG. 14),

Detailed Description Text (57):

As shown in FIG. 14, W.sub.i down is the window address for the lower end of the vehicle, while W.sub.i up represents the window address for the upper part of the vehicle. As described above, if a measured distance that can fit within $L(W.sub.i \text{ 'min}) + \dots DELTA.L(Vehicle)$ is present at the address W.sub.i up or higher that is higher than the lower end of the vehicle by a certain height, sensor line No. i may be assumed to contain the vehicle. $DELTA.L(Vehicle)$ can be determined by using $L(W.sub.i \text{ min}) = L(W.sub.i \text{ 'min})$ in Equation (14) (FIG. 7, S34 to S36).

CLAIMS:

4. An inter-vehicle distance measurement apparatus according to claim 1, wherein said vehicle detection means judges for all the optical sensor arrays in which an image of the white line is absent whether a nearest measured distance corresponds to one of a vehicle candidate and a road surface, based on the nearest measured distance at which a measurement window is located at a lowest position among the measured distances detected on one optical sensor array, and a measured distance from a measurement window at an address higher than a starting point window address of the measurement window with the nearest measured distance by at least a number of addresses corresponding to a height of a vehicle possibly present at the nearest measured distance;

said vehicle detection means determining, if the nearest measured distance is judged to be the vehicle candidate, the nearest measured distance as a vehicle candidate distance and a relevant optical sensor array as a vehicle detection candidate sensor line;

said vehicle detecting means calculating, if the nearest measured distance is determined to be the road surface, a relationship between an address of each higher measurement window from the starting point window address and an expected distance to the road surface at that address, comparing the expected distance to the expected road surface with a corresponding measured distance in order to determine whether a vehicle candidate is present at a distance greater than the nearest measured distance, and determining, if there is the vehicle candidate, the measured distance to the vehicle candidate as the vehicle candidate distance and the relevant optical sensor array as the vehicle detection candidate sensor line; and

said vehicle detection means confirming that a difference between maximum and minimum numbers of the vehicle detection candidate sensor lines corresponds to a width of the second vehicle possibly present at the vehicle candidate distance, and determining that the vehicle candidate is the second vehicle.

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